



The Whole House Retrofit Plan for 123 Anywhere Street, AB1 2CD





Executive Summary

We propose a reduction of energy usage, lower energy bills and a lower carbon footprint for your home. We calculate that you will also have a home which is warmer in all rooms and that you can come off fossil fuels completely if you wish. Much better ventilation is proposed and we think that you and your family will notice the positive impact of this within a day or two of the early installation changes.

Amongst other changes we have included

- better ventilation
- more loft insulation, including important ventilation for the structural roof timbers
- cavity wall insulation
- underfloor insulation to the new concrete floor
- insulation introduced under the suspended timber floor
- new heating controls including intelligent radiator valves upstairs and full zonal control
- a heat pump system for heating and hot water
- solar photovoltaic panels

For intelligent improvement, all Energy Efficiency Measures (EEMs) are placed in best practice order for retrofit and budgeting. Each is assigned to a phase of work and you can time the phases according to your accepted levels of affordability and disruption, allowing for the needs of your family and at suitable times. You could decide to do the first Phase sooner and remaining Phases later, or even by subsequent owners of the property.

For the best 'whole house' approach, we would advise that you ensure that your chosen Contractor states exactly what work is proposed (set out in drawn plans, sections, elevations, construction details and specifications) and how it would combine with the advice in this document, to avoid clashes of intent at the design stage of the retrofit approach, to avoid negative unintended consequences post-retrofit and to ensure that energy saving measures are successfully instigated. We also advise that a Retrofit Designer be engaged, to design insulation junctions which prevent thermal bridging. This is a particularly important part of retrofit work and it is still rare to find a contractor who understands how to do it.



What We Have Noted for Your Hit List




- Global warming is top of your list for change and the house must have a lower carbon footprint
- Reduce the annual energy bills
- Remove the small but stubborn areas of mould in the bathrooms and on the spare bedroom wall behind the cupboard
- Get the whole house more comfortable – cooler in summer, warmer in winter
- Add whatever insulation is needed to achieve the above
- Include better ventilation, especially for the bathrooms and the children's rooms
- If affordable soon, fit solar panels and a heat pump – otherwise this can wait until later

Example

ONLY



Survey Notes

<p>1 – Loft Insulation</p>	<p>The loft insulation is only about 100mm deep. We would recommend 300-400mm, laid between and over the joists in a specified manner. There are other aspects to do with ventilation at the eaves, the chimney stack and the condition of the sarking, which must be attended to – see advice in Maintenance section.</p>	
<p>2 – External Wall Condition</p>	<p>The solid brick external walls must be treated with respect to their original design & construction so as to maximise their lifespan – which could be another 200+ years. Vapour permeable insulation is strongly advised and this will govern how floor and roof are insulated and how the junctions are to be formed.</p>	
<p>3 – Room-In-Roof Insulation</p>	<p>Insulation for the extension 'room-in-the-roof' was poorly installed, with numerous thermal bridges. Reforming the insulation from the inside may be possible as long as all critical areas are within reach.</p>	



Ventilation

During the survey we discussed the Internal Air Quality monitoring results and you related that sometimes the house is colder than it should be, even with the heating on full. We agreed that when measured, the levels of relative humidity in several rooms were significantly higher than is healthy and that high levels of humidity mean that a heating system has to work much harder to reach and maintain a comfortable temperature.

We also agreed that this needs to change – particularly as two of your children have asthma and their grandmother has moved in with you.

The separate ventilation survey report gives full details of the findings and recommendations, including improving the background ventilation for breathing, the extract ventilation for getting rid of moisture and smells in the air, and a pathway for cross-ventilation through your home via gaps under the internal doors.

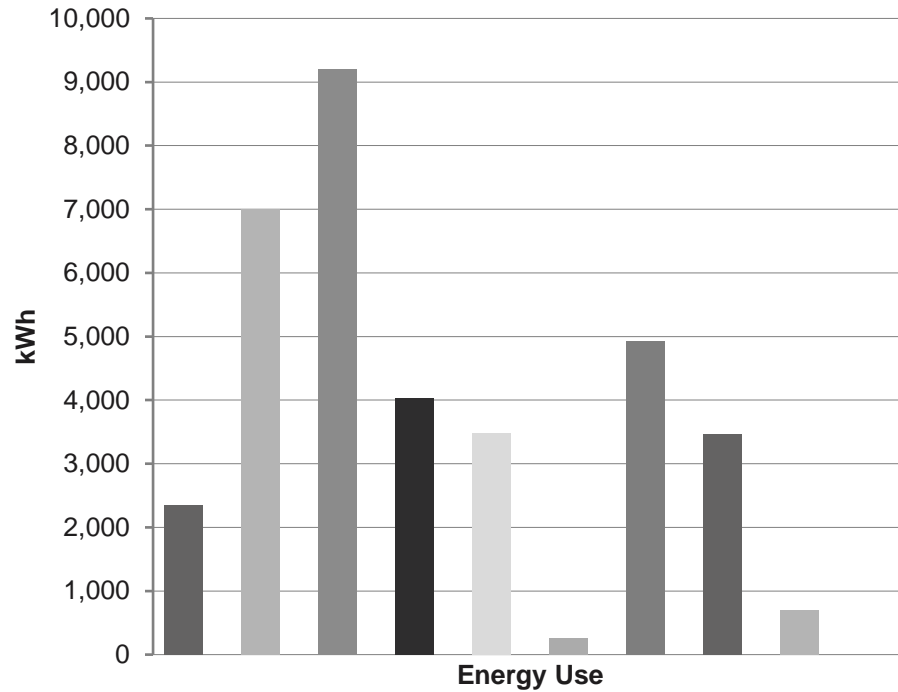
There are no recommendations made to change the purge ventilation because the current provision is sufficient. But other details for the new ventilation strategy, taking into account the number of rooms and the total floor area, are noted in that report.

Example Only

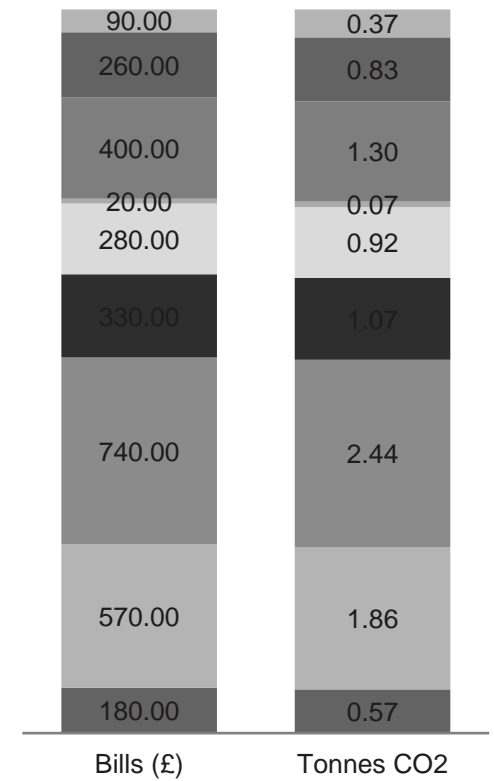


Whole House Retrofit Plan

Estimated existing energy use, bills & emissions



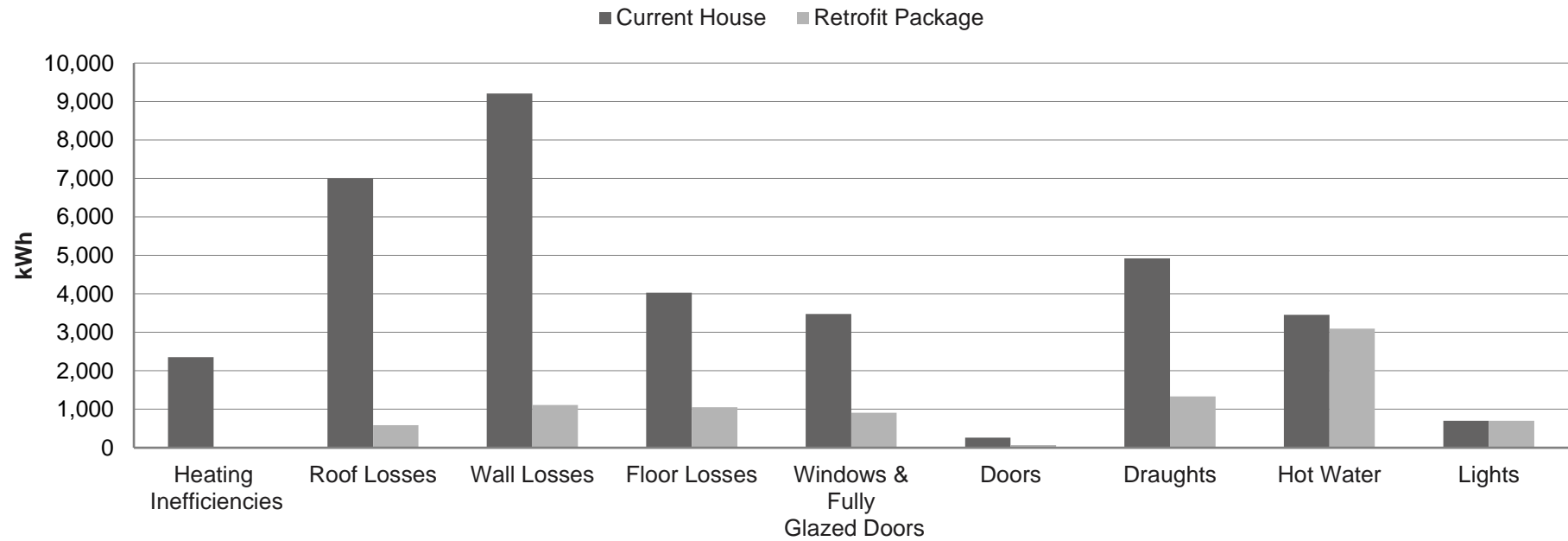
- Renewables
- Lights
- Hot Water
- Draughts
- Doors
- Windows & Fully Glazed Doors
- Floor Losses
- Walls Losses
- Roof Losses
- Heating Inefficiencies



Exam



Where we think you could get to



Example



Summary of Packages	Estimated Costs Per Phase	Energy Rating	Fuel Bill	tCO ₂	kWh/m ²
Your Existing Snapshot		36 F	£5,130	8.18	111.61
First Measures – ventilation & loft, etc	£8,600	38 F	£5,030	8.36	114.52
Next Measures – remaining insulation, etc	£19,200	57 D	£4,400	6.45	81.56
Full Final Improvements	£43,800	85 B	£2,350	0.72	97.83
All Phases Combined			46%	92%	

Note for this Example Report

Details of the Energy Efficiency Measures, their specific improvement implications, the alternative approaches considered, discussion of pros and cons and other related advantageous professional retrofit advice has been necessarily left out of this sample document.

Example



Some Definitions Which May Be Helpful

- Lifetime costs - these are costs or savings over the lifetime of the measure.
- Whole lifecycle cost analysis – this is a well-defined analysis that looks at capital costs, maintenance and running costs over the lifetime of the building for each measure or a package of measures. Often expressed as Net Present Value.
- CO2 savings – these are the carbon dioxide savings, often per year, due to installing an Energy Efficiency Measure (EEM)
- Energy savings – these are the energy savings, often per year, due to installing an EEM.
- Capital costs – this is the upfront cost of the measure and will include any remedial or ancillary work as well.
- Simple payback – The cost of the measure divided by the annual savings in fuel bills gives the simple payback in years.
- Carbon cost effectiveness – The lifetime cost of the measure (capital cost minus savings) divided by the lifetime savings of carbon dioxide emissions.

example



Plan

Whole House Retrofit

Advice from your Retrofit Coordinator

Safety note: The climbing plant at the rear must be kept well clear of the boiler flue.

With a fossil fuel-burning device in the house, it is a fundamental point of life safety to have an accompanying, suitably located carbon monoxide detector / alarm which is tested weekly.

Key Maintenance Notes:

All external sub-floor ventilation grilles (also referred to as air bricks) must be kept clear of obstruction, including periodic removal of cobwebs, leaves, plant growth, etc. A pathway from front to back beneath the house to enable good cross-ventilation is important.

The DPC should not be closer to the external ground level than 150mm (minimum) – in several places this limit is breached.

All external sub-floor ventilation grilles (also referred to as air bricks) must be kept clear of obstruction, including periodic removal of cobwebs, leaves, plant growth, etc.

A pathway through the house to enable good cross-ventilation is important.

Keep all trickle vents open all of the time in all rooms EXCEPT for Wet Rooms (Kitchen, Bath, Shower, WC, Utility, and anywhere else with a sink or tap).

Fully insulate the warm pipework leading to and from the hot water cylinder.

If windows do not close fully against draught seals – get skilled professional window expertise to adjust / repair the hinges on these and to replace the draught seals where necessary.

Watch for plants & growth near vulnerable parts of the building, including extract fan grilles, brick joints, gutters, rainwater pipes, door & window junctions and seals.

The paint finish to external woodwork should be kept up to date (such as above the top rear dormer window).

Small amounts (less than 1m²) of mould on windows etc, should be removed using paper towels and immediately disposed of in an external bin.

Extract fan ductwork which does not have smooth internal walling restricts air flow, significantly reducing fresh air changes and shortening the life of the fans due to increased wear & tear on the bearings.

Low Energy Lighting

Low Energy lamps are those with a 'luminous efficacy' of greater than 75 lumens per circuit Watt' and the payback period is short.

Ventilation

See separate Ventilation Survey & Report.



Chimney Ventilation

Disused chimneys without ventilation are liable to get wet on their own, because even a well-swept chimney flue is lined with soot, which contains salts which naturally attract moisture. Add a 'sailor's cap' chimney pot on top of the chimney to prevent birds, etc entering the top of the stack. Add a chimney sheep to the throat of the chimney flue, to prevent draughts but allow water vapour movement. Removal of a fireplace, stack etc would advisably require professional input from a practising and experienced Chartered Structural Engineer.

Drying Clothes

When clothes are dried indoors – damp laundry on racks, socks on radiators, etc – the moisture they contain is released into the indoor air. This moisture does not simply disappear, it always goes somewhere. A build-up of water vapour inside the home, felt as humidity and seen as condensation, is known as 'moisture-loading' and a home with excess moisture will feel colder and take more energy to keep warm.

If clothes are wet, dry them outside, or in a tumble-drier. Get the most energy-efficient and affordable drier you can. Only dry clothes indoors in mechanically ventilated space which is closed off from the rest of the house as a last resort.

Loft Insulation

Keeping structural roof timbers appropriately ventilated according to their position within the roof construction is very important – allow ventilation at the eaves, and prevent loft

insulation from blocking the path of air in getting to structural timbers to keep them suitably dry.

Loft Storage

Additional loft insulation can be paired well with loft storage, using 'loft legs'. Leave a minimum gap of 100mm between the top of the insulation and the soffit of the loft boarding.

Heating system

Switching to an Air Source Heat Pump with underfloor heating will involve some heatloss design work. Ensuring that you use an MCS-registered supplier and installer should ensure that good design standards and checks are adhered to, including correct location of the external condenser unit for noise and airflow access, tidy cabling and properly insulated pipework.

Photovoltaic Panels

Ensuring that you use an MCS-registered supplier and installer should ensure that good design standards and checks are adhered to, including roof strength and neat cabling work. Solar panels do need to be kept clean – not all 'self-cleaning' claims are reliable – all that is needed is basic window-cleaning kit to clear bird mess and algae, to maximise the return on your investment.

Water Efficiency

We suggest that the following replacement be made:

- Kitchen sink tap (or fitted restrictor) with max flow rate of 8 litre/min @3bar